

# IDAHO DEPARTMENT OF FISH & GAME

Joseph C. Greenley, Director

FEDERAL AID TO FISH AND WILDLIFE RESTORATION

Job Performance Report

Project F-72-R-1



FISH HATCHERY INVESTIGATIONS

Job I. Fish Disease Investigations

Job II. Fish Hatchery Effluent Monitoring

Period Covered: 1 July 1976 to 30 June 1977

by

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February, 1978

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JOB PERFORMANCE REPORT

State of Idaho Name: FISH HATCHERY INVESTIGATIONS

Project No. F-72-R-1 Title: Fish Disease Investigations

Job No. I

Period Covered: 1 July 1976 to 30 June 1977

ABSTRACT

During the period of this study (1 July 1976 to 30 June 1977) I visited each state hatchery at least once to observe fish condition and general hatchery practices. In addition, I responded to 45 requests for diagnostic services to determine causes of excessive fish mortalities. Various diseases were diagnosed and appropriate treatment recommended.

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## RECOMMENDATIONS

The Department should sponsor an annual short course for hatchery personnel that would cover all phases of fish culture that relates to fish health, particularly disease recognition, prevention, control and management techniques.

An effort should be made to determine if there is a correlation between the outbreak of certain diseases at each hatchery with various seasons of the year.

## OBJECTIVES

To monitor diseases and general health of fish at the 21 fish cultural installations operated by Idaho Department of Fish and Game and prescribe treatment.

To diagnose unknown diseases at hatcheries and to prescribe prophylactic disease control measures or medicines to effect cures.

## INTRODUCTION

The Idaho Department of Fish and Game operates 21 fish hatcheries and rearing ponds that annually produce about 1,500,000 lb of fish (Fig. 1).

The project leader visits each hatchery at least once each year to routinely examine their fish for disease and general health. If disease is encountered, it is diagnosed and steps for a cure are prescribed. Hatchery management practices are also evaluated as they relate to fish health.

The project leader is on call to make an emergency call to any hatchery that develops a disease problem during the year.

The Department purchases a portion of their fish and fish eggs from other states or commercial sources. The project leader inspects these eggs and fish for disease prior to acceptance by the Department.

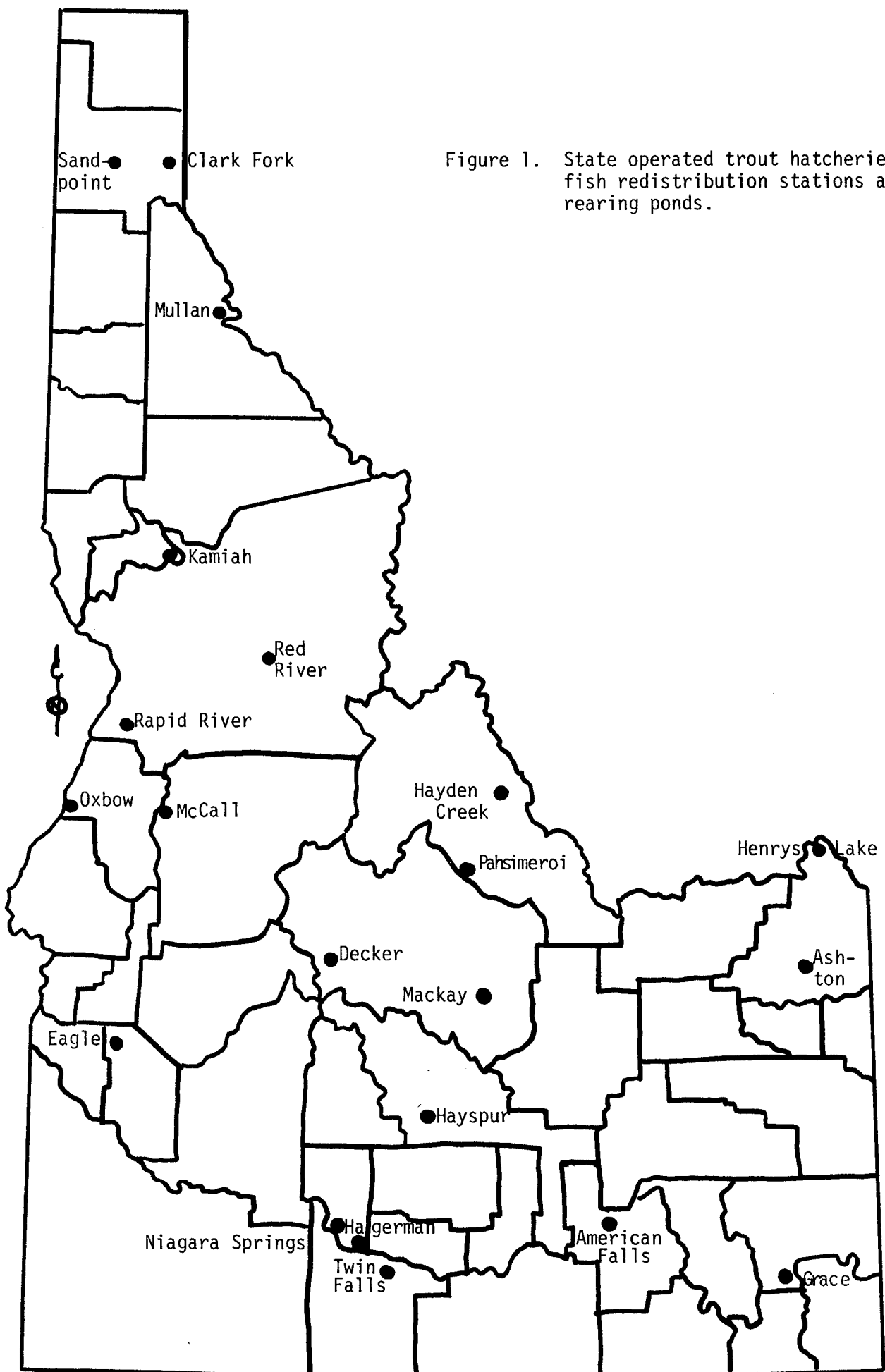
Fish feed samples are also analyzed for nutrient value and for quality control.

Water supplies are frequently analyzed for chemical characteristics.

## TECHNIQUES USED

The Department maintains a small laboratory located at the Hagerman Hatchery. This laboratory is equipped to provide facilities where most fish diagnostic work can be accomplished.

Necropsy procedures and diagnoses are based on standard methods established by the Fish Health Section of the American Fisheries Society and publications of research workers. Occasionally assistance is given by other state, federal



and private laboratories.

Occasionally dual infections are present and no attempt is made to isolate individual species if treatment is the same for both species.

#### FINDINGS

There were 45 requests for diagnostic services to determine causes of excessive fish mortalities at state hatcheries from 1 July 1976 to 30 June 1977. These calls were for major problems only and do not include many minor examinations or managerial and environmental problems. Many of the problems required more than one visit and in some cases recurrences of diseases happened at a later date.

A summary of the general operation and diagnoses of disease problems at each fish cultural station follows.

##### American Falls Hatchery

American Falls Hatchery is located in Power County near American Falls. American Falls is primarily a rainbow trout hatchery but also produces a significant number of cutthroat trout, kokanee and coho salmon as well as brown trout are also normally kept at this station. Annual production averages about 150,000 lb. Several routine visits were made to this station during the year with no unusual mortalities noted or no disease problems diagnosed.

##### Ashton Hatchery

Ashton Hatchery is located in Fremont County near Ashton. Ashton is primarily a rainbow station but raises other species such as cutthroat trout and coho salmon. Approximately 50,000 lb of fish is produced each year at Ashton. During the year I made a number of routine visits to this station and also investigated a fish mortality problem in the rainbow inventory. I found that a portion of the rainbow were infected with bacterial gill disease and this was the cause of the mortalities. I also found external parasites on the rainbow (Gyrodactylus and Costia).

##### Clark Fork Hatchery

Clark Fork Hatchery is located in Bonner County near Clark Fork. This station handles rainbow, cutthroat, Kamloops trout, Dolly Varden and kokanee salmon. Annual production averages about 45,000 lb at this station. I made one routine visit to the station during the year and did not diagnose any disease problems.

##### Decker Rearing Pond

Decker Pond is located in Custer County near Stanley, Approximately 7,500 lb of spring chinook salmon are reared in the pond each year. The fish are introduced in the pond in early summer and released to the Salmon River that fall. During the year I made several visits to the pond to investigate a severe infection by the eye fluke (Diplostomum spathaceum). At one point the

infestation infected almost 100% of the rearing fish, I recommended treatment of the pond with copper sulfate when it was dried after fish release in order to kill the snails which act as a host for this organism. Treatment was only partially successful in removing the snails and rearing at this location may not be advisable unless the snail population can be eliminated.

#### Eagle Hatchery

Eagle Hatchery is located in Ada County near Eagle. The bulk of Eagle's production is rainbow trout but this hatchery also raises cutthroat and brown trout and kokanee salmon. Annual production averages about 25,000 lb of fish. During the year I visited the Eagle Hatchery and diagnosed a problem with gas bubble disease. I recommended that a method be devised to tumble or agitate the water prior to use in order to free the excess gas.

#### Grace Hatchery

Grace Hatchery is located in Caribou County near Grace. Grace primarily produces rainbow and cutthroat trout. Approximately 110,000 lb of fish are raised at this hatchery each year. I routinely visited the hatchery several times during the year and once to investigate losses in cutthroat brood stock. The fish had a bacterial infection but a portion of the mortalities were probably due to the rigors of spawning.

#### Hagerman Hatchery

Hagerman Hatchery is located in Gooding County near Hagerman. Hagerman is the state's largest producer of catchable rainbow trout with annual production approaching 500,000 lb of fish. During the year I diagnosed red-mouth disease, Aeromonas liquefaciens, Infectious Pancreatic Necrosis (IPN), bacterial gill disease, myxobacteria, and other bacterial infections at this station. I recommended that Terramycin (TM-50) be added to the feed to control the red-mouth, Aeromonas, myxobacteria and other bacterial outbreaks.

#### Hayden Creek Hatchery

Hayden Creek Hatchery is located in Lemhi County near Lemhi and is operated as a research station for spring chinook salmon and steelhead. Approximately 30,000 lb of fish are raised annually. I routinely visited this station during the year and found no disease problems.

#### Hayspur Hatchery

Hayspur Hatchery is Idaho's oldest hatchery and is located in Blaine County near Bellevue. Hayspur is primarily a rainbow trout station but occasionally handles other species such as kokanee salmon. Annual production approximates 150,000 lb of fish. I visited this station a number of times during the year and isolated a bacterial infection and recommended that TM-50 be added to the feed as a control measure.

#### Henry's Lake Hatchery

Henry's Lake Hatchery is located in Fremont County north of Ashton. Henry's



Lake is primarily a cutthroat trout egg taking station, About 1,000 lb of cutthroat are reared at the hatchery each year for release in Henrys Lake. The remaining cutthroat trout eggs are shipped to other hatcheries around the state to meet their needs. No disease problems surfaced at this station during the year.

#### Kamiah Redistribution Station

The Kamiah facility is located in Lewis County near Kamiah. This station is used as a depot for redistribution of catchable trout that are raised at Hagerman Hatchery (about 40,000 lb). No disease problems were noted at this station during the year.

#### Mackay Hatchery

Mackay Hatchery is located in Custer County near Mackay, Rainbow make up the bulk of the production at Mackay but other species such as spring and summer chinook are also kept at this station. Annual production averages about 120,000 lb. I made several trips to Mackay during the year to investigate excessive fish mortalities. A low dissolved oxygen problem caused chinook fry to come out prematurely but was not a major problem. I also diagnosed outbreaks of kidney disease and various bacterial infections including myxobacteria in the chinook. I recommended that TM-50 be added to the diet to control the bacterial infections.

#### McCall Hatchery

McCall Hatchery is located in Valley County at McCall. McCall raises rainbow and cutthroat trout and summer chinook salmon. This station also serves as a redistribution station for catchable trout raised at Hagerman (about 60,000 lb). About 1,000 lb of fish are raised at McCall each year, During the year I found chinook at this hatchery infected with gill parasites, bacterial infections and a swim bladder abnormality caused by fungus, Standard treatment was recommended for the gill parasites and bacterial infections.

#### Mullan Hatchery

Mullan Hatchery is located in Shoshone County east of Mullan. Mullan raises cutthroat trout and kokanee and coho salmon. Annual production is about 2,000 lb while about 60,000 lb of catchable rainbow trout from Hagerman are redistributed from this station. I routinely visited this station during the year and did not diagnose any disease problems.

#### Niagara Springs Hatchery

Niagara Springs Hatchery is located in Gooding County near Wendell. Niagara Springs raises about 250,000 lb of steelhead trout each year. I spent considerable time at Niagara Springs during the year to investigate excessive mortalities. I found the fish suffering from a dietary deficiency at one time and from red-mouth and IPN at other times. I recommended an altered diet and suggested that TM-50 be added to the feed to control the red-mouth infection.

#### Oxbow Hatchery

Oxbow Hatchery is located on the Snake River in Adams County. This station is used as a collection, holding and spawning area for adult steelhead that return to Hells Canyon Dam. I routinely visited Oxbow Hatchery during the year and found no disease problems.

#### Pahsimeroi Hatchery

Pahsimeroi Hatchery is located in Lemhi County northeast of Challis. The Pahsimeroi Hatchery is mainly a steelhead, egg taking station but does rear about 6,000 lb of summer chinook annually, I visited this station during the year and found no disease problems.

#### Rapid River Hatchery

Rapid River Hatchery is located in Idaho County near Riggins. Rapid River is a spring chinook hatchery and produces about 200,000 lb of fish annually. Rapid River has had a kidney disease (KD) problem for several years. Dr. Klontz has devised a system of injection of returning adults with Erythromycin phosphate that has significantly reduced KD outbreaks and mortalities. I also identified an incidence of bacterial gill disease at Rapid River. Large losses occurred in juvenile fish during the year that appeared to be the result of introduction of a toxicant upstream from the water supply.

#### Red River Rearing Pond

The Red River Pond is located in Idaho County near Elk City. This is a new facility and will rear spring chinook for release in the upper South Fork Clearwater River drainage. This will be the initial year of operation for this facility.

#### Sandpoint Hatchery

Sandpoint Hatchery is located in Bonner County near Sandpoint. Sandpoint raises cutthroat, brook and Kamloops trout as well as kokanee and chinook salmon. About 10,000 lb of fish is raised annually. I visited this station during the year and did not diagnose a disease problem.

#### Twin Falls Hatchery

Twin Falls Hatchery is located in Twin Falls County at Twin Falls. Budgetary problems forced permanent closure of this hatchery on 1 January 1977

#### Miscellaneous

I diagnosed the occurrence of red-mouth at Hagerman National Hatchery during the year.

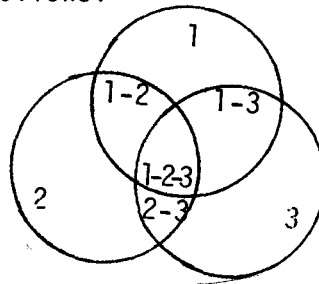
A severe fish kill at Lake Lowell resulted in loss of many fish including numerous carp. Definite cause of the mortalities was not determined but an agricultural pesticide was suspected.

A sample of rainbow trout that had died in Magic Reservoir was sent to me for diagnosis. I identified a severe bacterial infection and speculated that this was the cause of death.

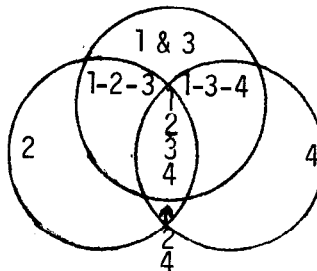
## DISCUSSION

Many of our hatchery water supplies have inherent potential disease organisms present which may cause no problems. However, excessive mortalities may occur when conditions are ideal for the pathogens or when the fish are stressed.

Wood (1974) suggests the following interaction which favors a disease outbreak: (1) host, (2) pathogen and (3) environment. This relationship might best be illustrated as follows:



I agree with Wood but suggest a similar configuration with two important differences. Interaction of factors which favor a disease outbreak : (1) host and (3) environment as same circle, (2) pathogen and (4) management.



We are becoming increasingly aware of the role that proper hatchery management plays in general fish health and well being. Certain hatchery management practices are beyond the control of the hatchery manager and are dictated by administrative, political, social or economic considerations. However, hatchery managers are becoming more aware of the proper management of those items that are within their control and this is almost certain to improve the environment that the fish inhabit and promote better fish health.

Control of fish disease is becoming more difficult as more compounds are removed from the list of those registered for use on food fish. Presently there are only four compounds commonly used in fish culture that are registered. These include copper sulfate, salt, terramycin and sulfamerazine. The Fish and Wildlife Service's Fish Control Laboratory at La Crosse, Wisconsin has been designated as the lead facility to coordinate efforts to expedite the registration of high priority chemicals.

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## JOB PERFORMANCE REPORT

State of Idaho Name: FISH HATCHERY INVESTIGATIONS

Project No. F-72-R-1 Title: Fish Hatchery Effluent Monitoring

Job No. II

Period Covered: 1 July 1976 to 30 June 1977

### ABSTRACT

In compliance with the provisions of the Federal Water Pollution Control Act, fish hatcheries are authorized to discharge, under the National Pollutant Discharge Elimination System (NPDES), a restricted amount of settleable and suspended solids to receiving waters. Monitoring of these and other parameters is required. Removal of settleable solids is needed to achieve final limits of permits. Reports of findings and data storage is also required by Federal law. During the period of 1 July 1976 to 30 June 1977 we monitored effluent discharges at the 11 state fish hatcheries that fall under these criteria.

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## RECOMMENDATIONS

Continue monitoring hatchery effluents.

Complete construction of settling systems where needed.

## OBJECTIVES

To monitor the effluent from 11 state fish hatcheries to insure effluent meets limitations imposed by the Environmental Protection Agency (EPA) through National Pollutant Discharge Elimination System (NPDES) Permits.

## TECHNIQUES USED

The Environmental Protection Agency (EPA) requires pollutant discharge permits for fish hatcheries which produce 20,000 lb of fish or more during the year.

The Idaho Department of Fish and Game operates 11 fish hatcheries which require permits: American Falls, Ashton, Clark Fork, Eagle, Grace, Hagerman, Hayden Creek, Hayspur, Mackay, Niagara Springs and Rapid River.

Parameters required by permits include settleable solids, suspended solids, flows and dissolved oxygen. Frequencies of samples and sample types vary from station to station, but generally are taken on a weekly basis. Samples are taken on incoming waters, outflows, cleaning and non-cleaning situations.

Filters from each hatchery are analyzed by a commercial laboratory and results are recorded and filed. Laboratory costs are billed against the individual hatcheries.

Monthly reports are recorded and quarterly reports are submitted to EPA.

If violations occur, additional written communication is filed to EPA stating nature of violation, causes and steps taken to prevent a recurrence.

Techniques are based primarily on established procedures set forth by "Standard Methods for Examination of Water and Wastewater".

In accordance with NPDES Permits, water samples are checked for concentrations of settleable solids and suspended solids. Settleable solids are measured in an Imhoff cone and readings are taken on material settled out after 1 hr. Suspended solids are determined by filtering sample through pre-weighed filters, oven dried and again weighed to obtain net gain.

## FINDINGS

We found that all readings for settleable and suspended solids fell within the limits of the permits during normal hatchery operations. However, during

cleaning operations, settleable solids may exceed limitations, if no settling facility is present.

Compilation of settleable and suspended solid concentrations is presented in Tables 1 and 2 as well as in Figure 1. The flow in cfs is presented for each hatchery in Table 3.

#### DISCUSSION

At the inception of the NPDES Permits, one set of sampling gear was purchased to monitor hatchery effluents. This necessitated almost constant travel to the 11 hatcheries involved. Subsequently sampling gear for each hatchery was provided and personnel were instructed as to usage and recording.

Several modifications have been made on original permits by EPA and has resulted in slightly reduced sampling. After over two years of intensive sampling, EPA has determined the area which efforts need to be concentrated in terms of pollution abatement is the settleable solids discharges.

Idaho Department of Fish and Game has completed major construction projects at Ashton, Grace, Hagerman, Clark Fork and Hayspur hatcheries to create settling lagoons for all hatchery effluent. Idaho Power Company has constructed a settling lagoon at the Niagara Springs site. Future construction may be needed at the Hayden Creek and Mackay facilities.

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Biological Field and Laboratory Methods. 1973. United States Environmental Protection Agency

Methods for Chemical Analysis of Water and Wastes. 1974. United States Environmental Protection Agency.

Standard Methods for the Examination of Water and Wastewater. 1971.

Water Quality Standards and Wastewater Treatment Requirements. 1973. Idaho Department of Environmental and Community Services.

Table 1. Settleable solid concentrations (ml/l) at Idaho hatcheries, 1 July 1976 - 30 June 1977.

Station	Settleable solid concentrations											
	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
American Falls	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ashton	0.2	0.2	0.2	0.2	0.5	0.3	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Clark Fork	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Eagle	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Grace	0.15	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hagerman	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hayden Creek	<0.1	0.2	0.2	0.1	<0.1	0.1	<0.1	0.1	0.16	0.18	<0.1	<0.1
Idayspur	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Mackay	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1
Niagara Springs	0.6	1.1	1.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.2
Rapid River	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1



Table 2. Suspended solid concentrations (mg/l) at Idaho hatcheries, 1 July 1976 - 30 June 1977.

Station	Suspended solid concentrations											
	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
American Falls	0.1	1.0	1.4	0.5	0.9	1.5	0.1	0.8	0.6	0.5	3.6	3.5
Ashton	4.5	0.6	0.2	2.4	10.8	1.3	9.8	4.3	0.2	12.6	12.0	11.6
Clark Fork	1.2	0.4	0.1	0.1	0.7	0.2	1.2	0.5	1.4	0.1	0.5	1.3
Eagle	1.6	0.2	0.1	1.8	1.1	1.4	2.2	1.8	0.6	2.5	0.7	0.9
Grace	4.3	3.0	4.6	8.9	14.5	9.9	4.6	11.6	13.3	3.7	7.6	7.4
Hagerman	4.4	1.9	0.2	5.5	6.8	4.1	3.8	2.6	8.8	2.7	3.0	3.6
Hayden Creek	3.0	4.8	0.6	6.2	3.8	5.1	6.6	8.7	11.8	7.6	3.2	5.0
Hayspur	4.7	13.7	1.7	1.2	10.1	1.2	0.0	1.8	0.0	6.5	3.3	2.8
Mackay	0.9	1.5	0.7	0.3	0.6	2.1	0.2	0.6	1.5	2.8	5.3	0.1
Niagara Springs	12.6	0.8	32.7	1.9	1.9	1.8	1.9	1.9	1.9	1.1	12.8	9.7
Rapid River	7.2	7.9	3.0	7.6	1.2	2.2	4.5	6.6	4.4	1.0	6.0	9.9

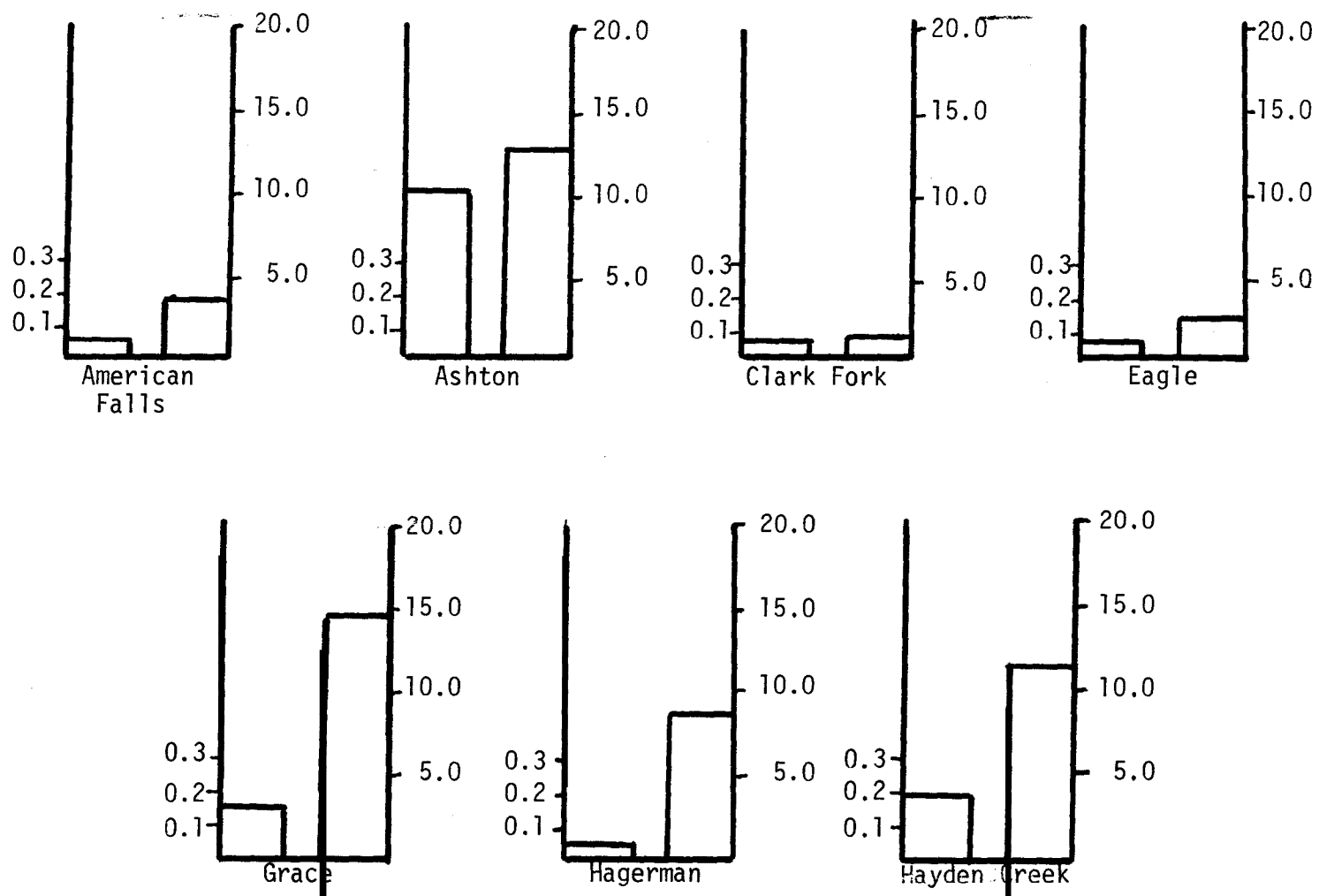


Figure 1. Maximum concentrations attained for settleable and suspended solids during 1 July 1976 to 30 June 1977 at American Falls, Ashton, Clark Fork, Eagle, Grace, Hagerman and Hayden Creek hatcheries (settleable solids, ml/l, in left bar and suspended solids, mg/l, in right bar).

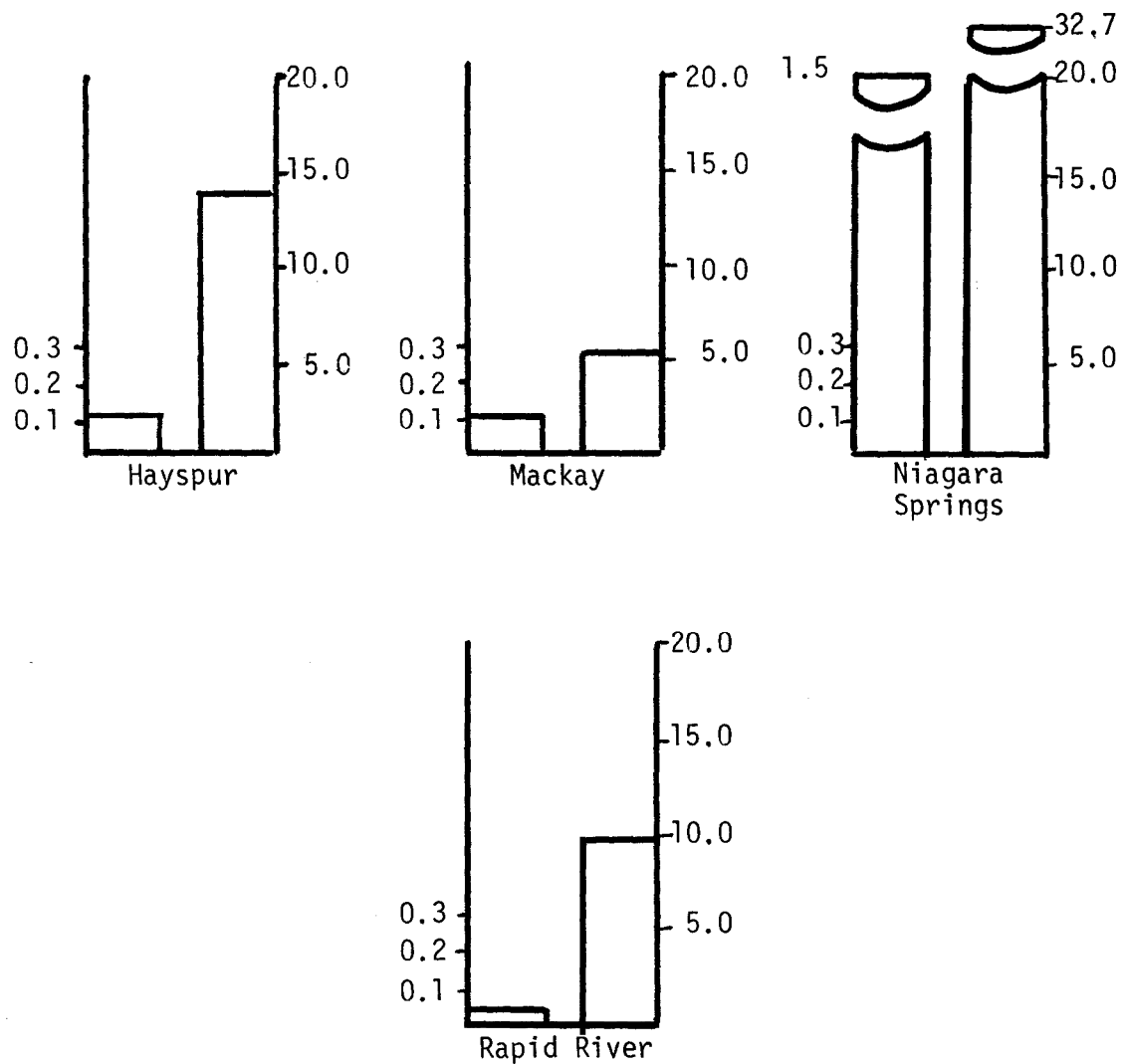


Figure 1. Maximum concentrations attained for settleable and suspended solids during 1 July 1976 to 30 June 1977 at Hayspur, Mackay, Niagara Springs and Rapid River hatcheries (settleable solids, ml/l, in left bar and suspended solids, mg/l, in right bar) (continued).

Table 3. Hatchery flows (cfs) at Idaho hatcheries, 1 July 1976 - 30 June 1977.

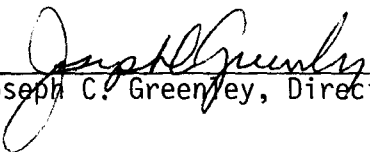
Station	Flow (cfs)											
	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
American Falls	4.4	4.2	19.5	4.2	20	20	20	20	20	20	20	18.9
Ashton	6	6	6	6	6	6	6	6	6	6	6	6
Clark Fork	8	6	6	6	6	6	8	8	8	8	6	6
Eagle	3	3	3	3	3	3	3	3	3	3	3	3
Grace	13	16.8	18.4	18	18	13	15	14	12.5	11.4	10.9	11
Hagerman	64	64	64	64	64	82	82	82	82	67	67	67
Hayden Creek	7	8	7	6	6	7	8	8	9	3.6	2	6
Hayspur	15	15	15	18	18	16.5	16	21	19	17	15	15,6
Mackay	22	22	22	22	22	22	22	22	22	22	22	22
Niagara Springs	21	24	28	39	39	51	62	62	34	28	3.3	18
Rapid River	46	46	46	46	46	46	46	46	46	46	46	46

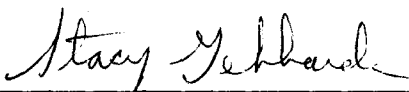
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